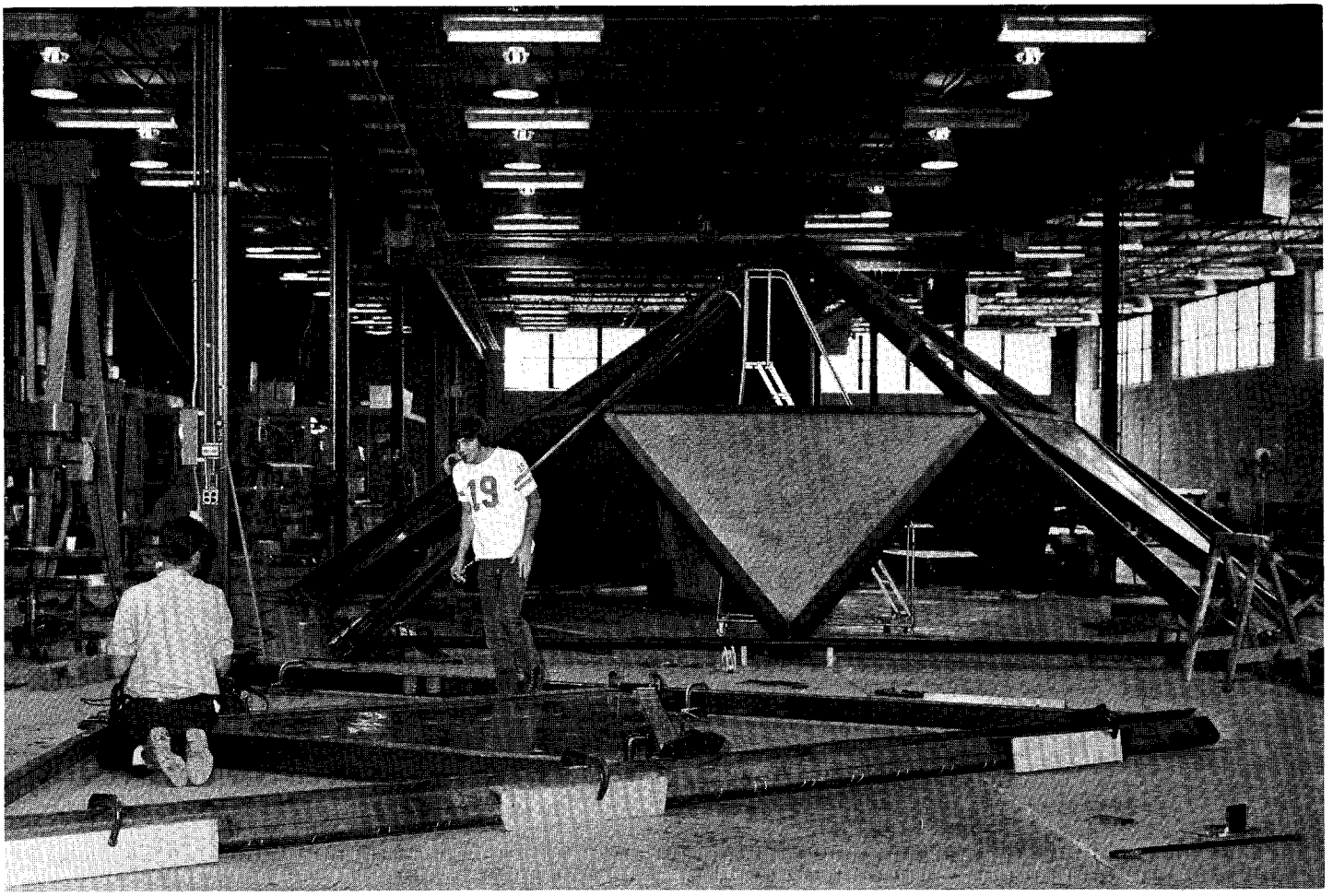
national accelerator laboratory FERMILAB-NAL-062
0090.01

MONTHLY REPORT OF ACTIVITIES

September 30, 1971



ASSEMBLY OF PANELS FOR THE BUBBLE-CHAMBER ROOF

Operated by Universities Research Association Inc. Under Contract with the United States Atomic Energy Commission

THE COVER: Assembly of the fiberglass and beverage-can sandwich panels for the roof of Building A of the Bubble-Chamber Area. Larry Chiplis (back to camera) and Phil Gerhardt are working on the assembly.

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MONTHLY REPORT OF ACTIVITIES

F. T. Cole

September 30, 1971

Abstract: This report summarizes the activities of the National Accelerator Laboratory in September, 1971.

Main Accelerator

The first part of September was utilized in coasting-beam studies and acceleration tests. Coasting beams lasting up to approximately one second were observed. The beam was captured by the rf and held during some one-hundred synchrotron oscillations. When the magnet was ramped slightly, the protons were accelerated several hundred MeV above injection energy.

Dry nitrogen was blown through the chamber in an effort to remove obstacles. Some debris was collected in this exercise. It is almost impossible in practice to avoid putting small cuttings into the chamber when the welded vacuum joints are cut apart to remove a magnet. As a result, the welded joints are to be replaced by commercial quick-disconnect seals.

Since the lifetime of the beam on injection has been adequate for acceleration to high energy, our attention turned back to the magnet. The objective now is to power the magnet to an excitation equivalent to 100 GeV. The magnets are being systematically "high potted" to 500 volts, i.e., raised to 500 volts above ground by the use of a high impedance power supply. Some 35 magnets have failed this test (presumably because of moisture) and are being replaced. Curiously, we seem to find that magnets with voltage on them are much less likely to fail than when they are left without voltage. Very few of

the magnets manufactured since April have failed. Most of the magnets that fail were produced among the first one-third of the production run after which a number of production bugs were ironed out.

As of this writing, Sector A is being ramped to an excitation of 100 GeV; the rest of the magnets are holding 500 volts. When the remaining five sections have been brought up to the same excitation, acceleration studies will start again.

Needless to say, the full weight of the Laboratory is being thrown into a massive effort to bring the Main Ring into operation.

Injector

In addition to providing 7-GeV beam for the main accelerator, the Operations Section was able to begin several experiments of interest for accelerating high-intensity beams.

The multi-turn injection system of the booster was put into operation. In the first experiments, the injection of four individual turns could be clearly observed, as should be the case according to the design. There were some losses in each of the turns. Under the best tuning conditions, 24 milliamperes was accelerated to 7 GeV using 35 milliamperes from the linac. The radial betatron-oscillation frequency ν_x was not moved to the value 6.5 required for four-turn injection without loss.

The linac began systematic beam studies at 80 milliamperes (slightly above the nominal beam intensity). Some emittance and momentum-spread data were taken. The preliminary results do not show any correlation between intensity and beam growth, but there has not yet been a systematic variation of the many parameters that can be adjusted.

Proton Switchyard

Even though almost all of the activity of the Laboratory is concentrated on the accelerator, some installation work on the beam lines to the experimental areas is still going on. All magnets in the beam line to the Neutrino Laboratory have been installed and are being brought into operation. Most magnets have been installed in the line to the Meson Laboratory. Figure 1 shows magnet installation in the Neutrino Laboratory itself.

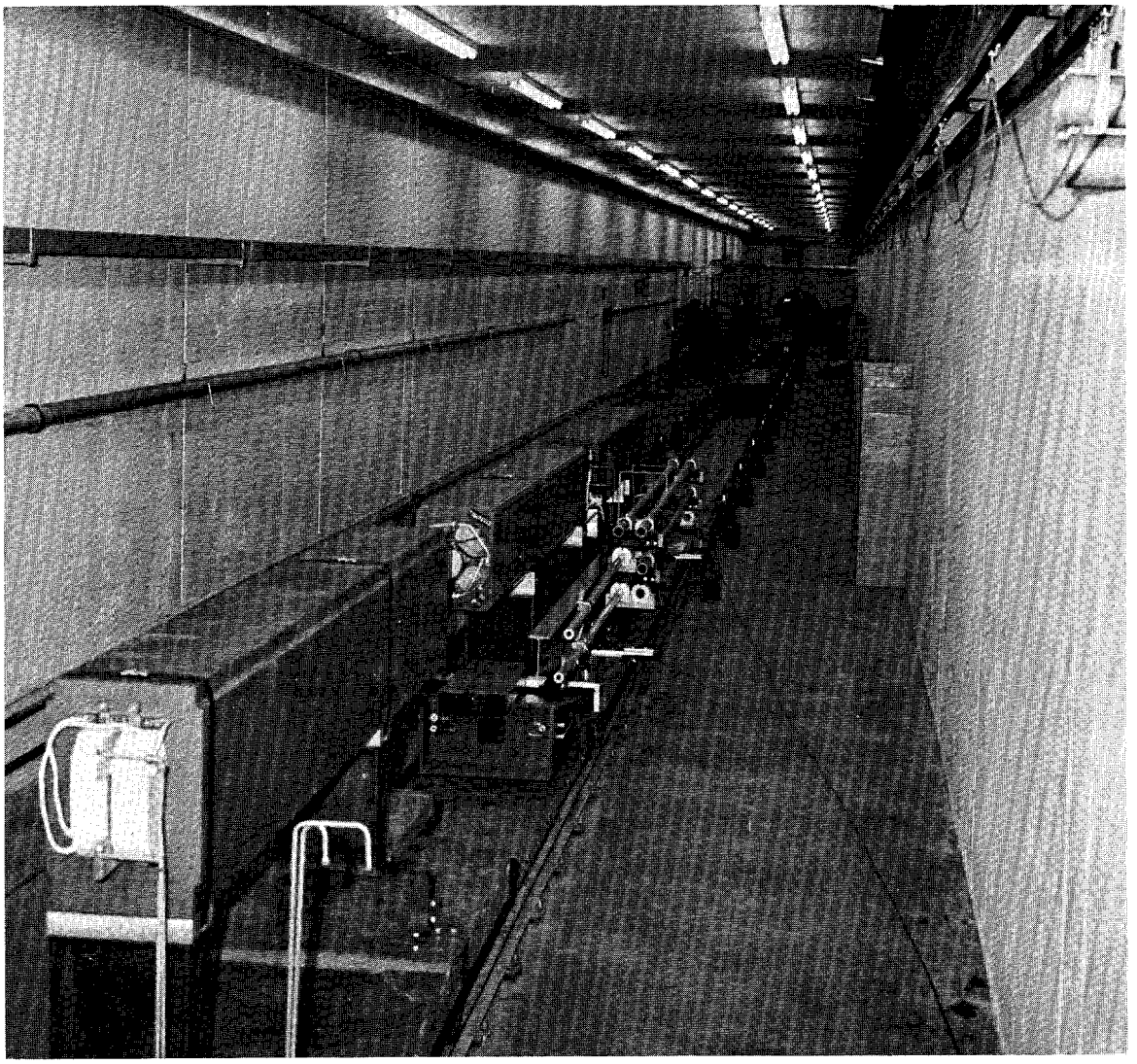

Fig. 1. Magnets being installed in the Neutrino Laboratory.

Construction

Central Laboratory. The ground floor is 94% complete. Work has begun on the second phase, the structure of the higher floors. This work is shown in Fig. 2.

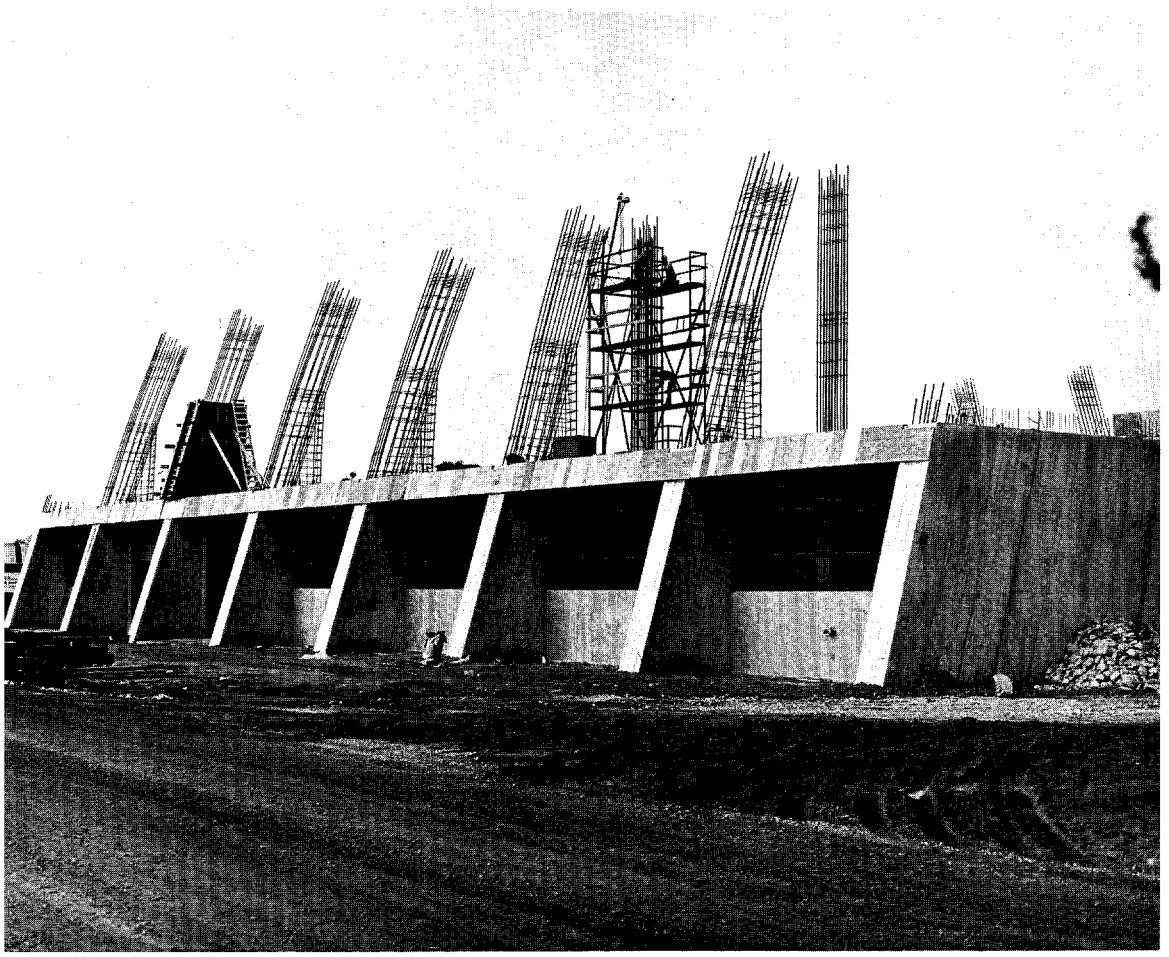

Fig. 2. Reinforcing and columns starting on the second phase of the Central Laboratory.

Meson Laboratory. All work except the Detector Building is almost complete. The mezzanine of the Detector Building is 92% complete and work has begun on the remainder of the building, as we see in Fig. 3.

Neutrino Laboratory. Work on the beam line is 67% complete. The buildings at the far end are 68% complete; most of the work is now inside the buildings.

Figure 4 is an aerial view. The beverage-can and fiberglass sandwiches for

Fig. 3. Looking south at the Detector Building of the Meson Laboratory.

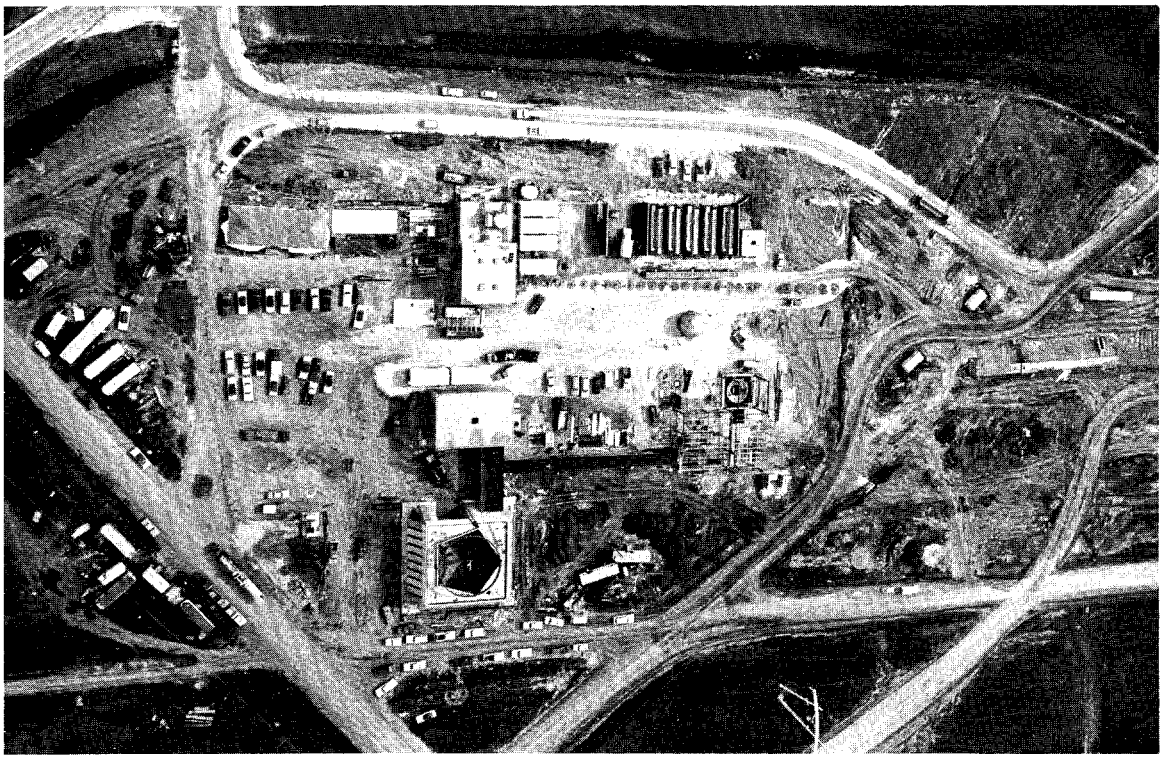

Fig. 4. Aerial view of the Bubble-Chamber Area. The accelerator is to the right of the photograph.

the roof of Building A are virtually complete and subassembly is being carried out, as we see in the cover photograph, prior to installation.

Proton Laboratory. The work in progress is divided into four contracts, going down the beam line. In the first contract (43% complete), sheet-piling work has been finished south of the woods, near the main beam dump, and piling is now being driven north of the woods. This work is seen in Fig. 5.

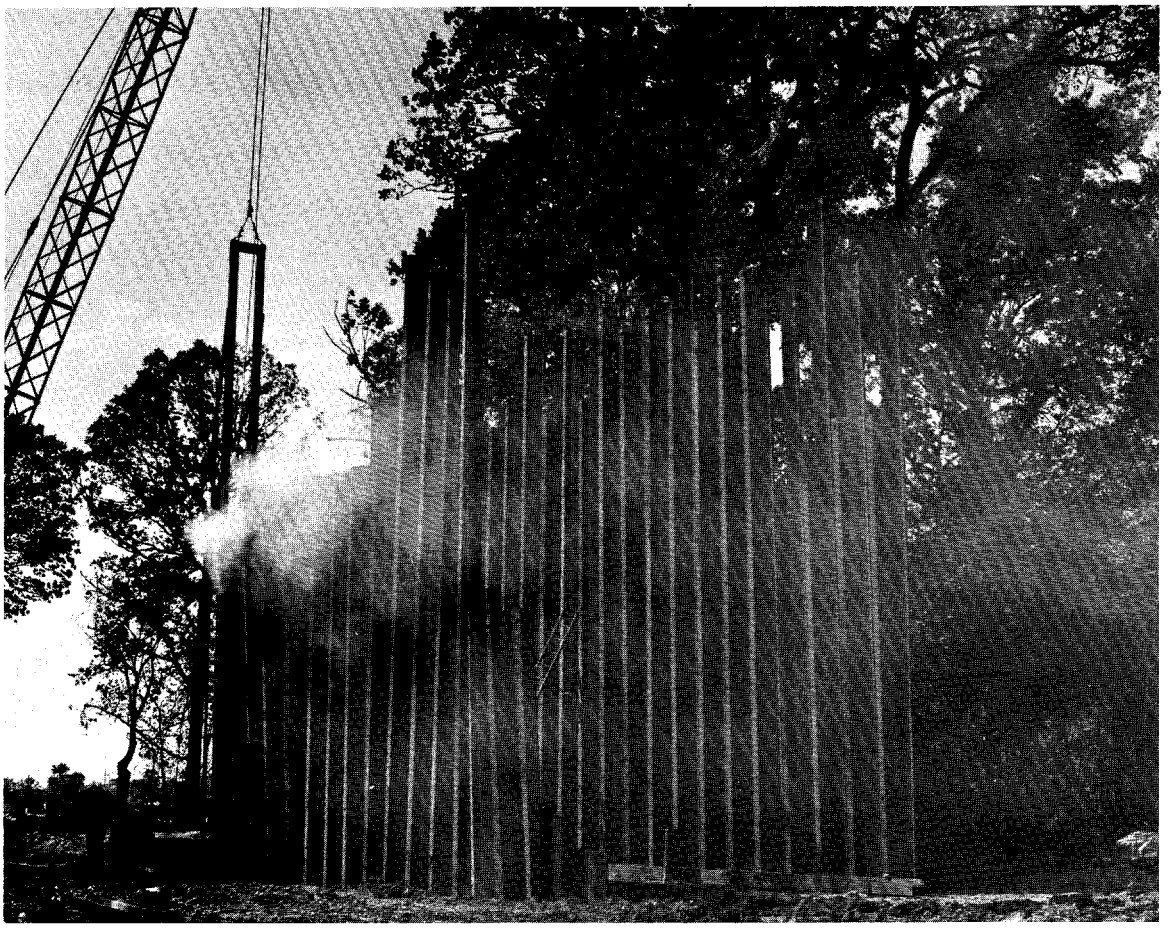

Fig. 5. Sheet-piling work on the beginning of the Proton Laboratory.

In the second contract (45% complete), all enclosure roofs are completed. This work is seen in Fig. 6. In the third contract (36% complete), 300 feet of beam pipe is finished and being backfilled, as shown in Fig. 7. In the

Fig. 6. Work on the second part of the Proton Laboratory. The Neutrino Laboratory berm is at the right.

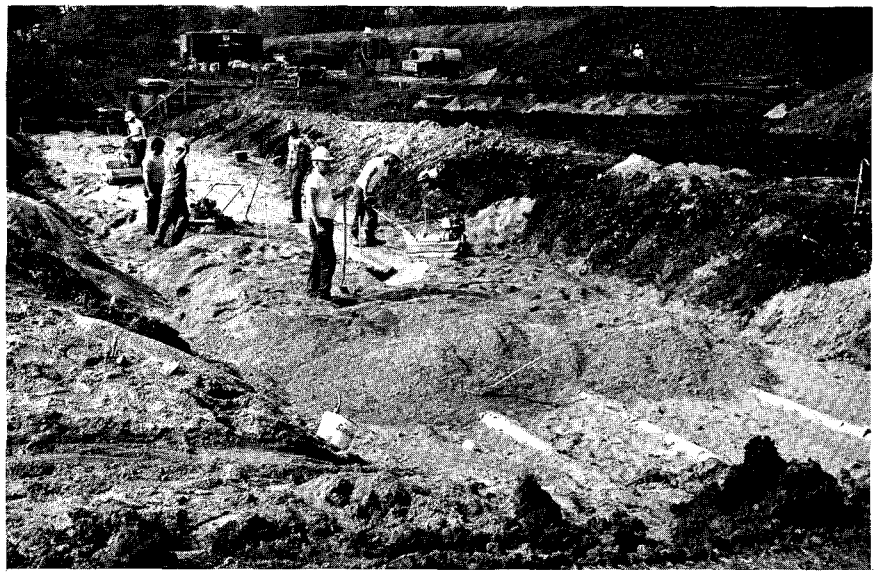

Fig. 7. Beam pipe being covered in the Proton Laboratory.

fourth contract, the easterly part, shown in Fig. 8, has been scheduled for early completion and is moving rapidly. Steel work is beginning on the remainder of the fourth part.

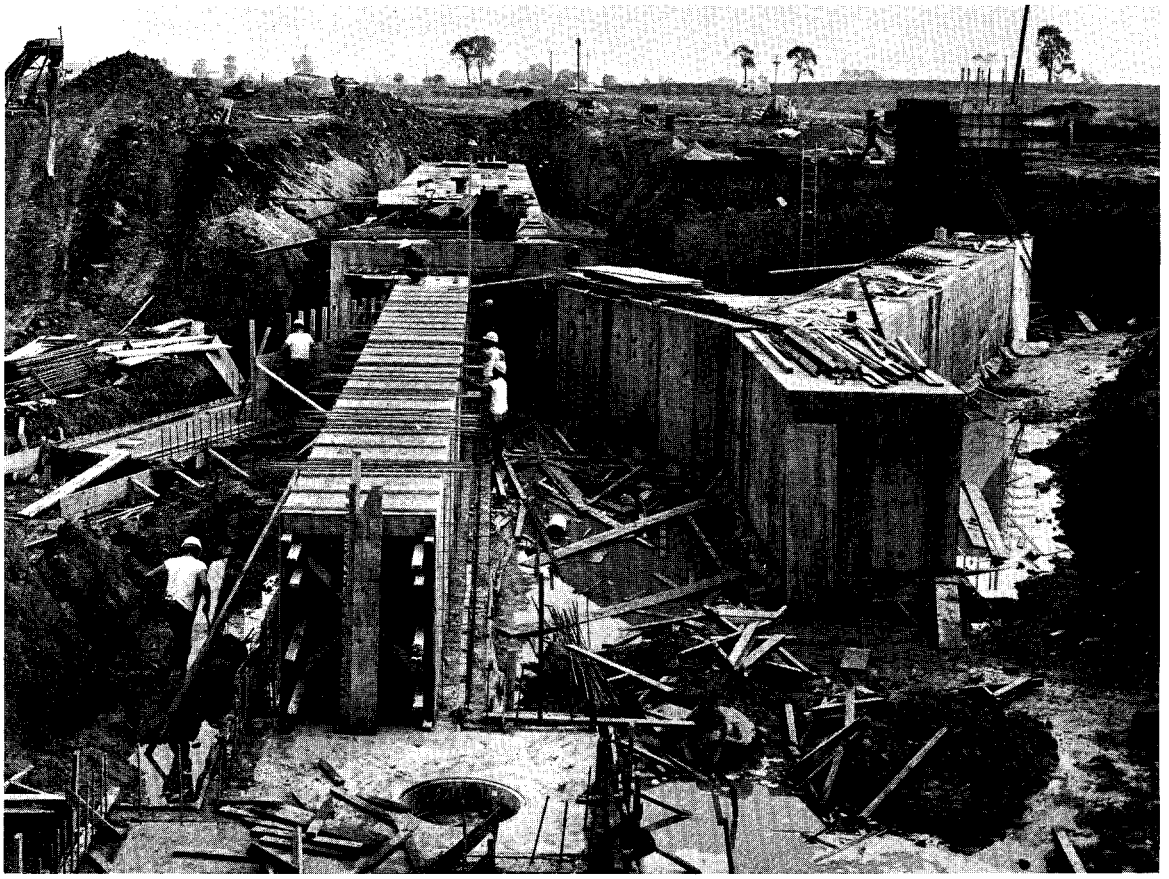

Fig. 8. The far end of the Proton Laboratory. This view looks along the beam direction. The old Feldott Road is beyond.

Errata

In the list of approved proposals given in last month's report, Notre Dame, Duke, Toronto, Wisconsin, and Purdue should be added to Caltech and NAL as institutions responsible for Experiment 21. In addition, Cornell should be added to Experiment 87-A to join Columbia, Hawaii, and Illinois. Notre Dame should be deleted from Experiment 154.